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## Notes on Mexican Tiger Beetles Belonging to the Genus *Cicindela* (Coleoptera, Cicindelidae)

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Since the publication of "A review of the Mexican tiger beetles of the genus *Cicindela*" (Cazier, 1954), a considerable amount of new material has been collected, and two species which were not available before 1954 have been presented to the writer for study. Most of the new material was collected on the 1953 and 1954 David Rockefeller Mexican Expeditions which covered most of the central, northern, and western states of Mexico. The 1953 expedition was made by Charles and Patricia Vaurie who visited the states of Durango, Zacatecas, Aguascalientes, San Luis Potosi, Jalisco, Guanajuato, Colima, Nayarit, and Sinaloa. Comparatively little material had been available previously from a number of these states, but it was known that tiger beetle populations from the area exhibited considerable variability and often showed subspecific hybridization characteristics. The 1954 expedition was made by Willis Gertsch, Mr. and Mrs. George Bradt, and the author who covered the west-coast states of Sonora, Sinaloa, Nayarit, Jalisco, and Colima. Special effort was made to collect in known areas of hybridization in these states and to enlarge our samples of a number of confusing species.

In 1954 the author lacked specimens of seven of the 78 known

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species. These were *chrysippe* Bates, *hogeii* Bates, *ioessa* Bates, *nudata* W. Horn, *speculans* Bates, *smaragdina* Chevrolat, and *craveri* Thomson. Apparently these species were not represented in North American collections, and but few specimens have ever been collected. Through the kindness of Dr. C. Bolivar, four female specimens of *smaragdina* have since been made available for study, and through the generosity of the Reverend B. Rotger, C.R., one female of *craveri* has been examined. Because the original descriptions and locality data are poor, both species are redescribed herein.

No attempt is made to give all the new locality data, as most of the additional records fall within or close to the known distributional range of the species (Cazier, 1954). However, in several species the distributional range is extended considerably by these new records, and previously unknown population variability was exhibited in samples from several areas.

The writer would like to acknowledge the continued aid given by Dr. David Rockefeller whose support has made possible many expeditions in the Western Hemisphere which have made available material for study that continues to contribute to our knowledge of the insect fauna. Special appreciation is extended to Miss Marjorie Statham who made the illustrations. To Dr. and Mrs. Charles Vaurie I extend my thanks and credit for the pictures of the tiger beetle habitats and for the fine collections they made. I am also deeply indebted to Dr. Willis J. Gertsch and Mr. and Mrs. George Bradt for their valuable assistance on the 1954 expedition. To Dr. C. Bolivar and the Reverend B. Rotger, C.R., go my thanks for making available specimens of the two species not previously available.

*Cicindela craveri* Thomson

Figure 1

*Cicindela craveri* THOMSON, 1856, Rev. Zool., Paris, ser. 2, vol. 8, p. 528.

Large, robust; color dull alutaceous green above, brilliant green beneath; humeral lunule represented by basal and apical spots, middle lunule angulate, inner arm projecting obliquely posteriorly and towards suture, not reaching margin or suture, apical lunule complete, reaching suture, inner projection elongate, curved, apex pointing towards base; pronotum pilose laterally; head bare except for ocular setae; under surface sparsely pilose laterally; female with apex of elytra shallowly, separately rounded.

FEMALE: Head with longitudinal furrows shallowly impressed, front not impressed, head, including the eyes, slightly narrower than width

of pronotum; antennal segments 1 through 4 green, remainder black, scape with three median setae and one subapical seta; labrum tridentate, shallowly produced medially, single transverse row of submarginal setae; maxillary palpi with segments 1-3 green, segment 4 black; labial palpi with segments 1 and 2 ferruginous, segment 3 green, with black apex; gena bare. Pronotum one-fourth wider than long, widest in front of middle, margins strongly constricted apically, feebly constricted basally, bordered laterally, hind angles prominent, transverse impression deep, median line only slightly impressed, sparsely pilose laterally. Elytra impunctate basally except for a few setigerous pits in basal third, apical margins not serrate, side margins broadly rounded, widest at apical third, apices shallowly separately rounded, sutural spine very small. Under surface green except for black last abdominal segment, sparsely pilose laterally, prosternum bare; legs green except for black apical tarsal segment; anterior and middle trochanters with subapical setae. Length, 18.0 mm.; width, 7.8 mm.

The single specimen from which the above description was made was submitted to the writer for examination by the Reverend B. Rotger, C.R. No specific localities had been known previously for this species, and the type locality is given only as "Mexico." The example described above was collected at Hueyapan, Hidalgo, Mexico, July 4, 1953, 2050 meters, by Dr. C. Bolivar. The author (1954, p. 238, footnote) has indicated that, according to the literature, *C. craveri* would probably key out beyond couplet 60. The specimen at hand has the under surface sparsely pilose and will, therefore, key out to *C. obsoleta* in the second paragraph of couplet 88. It can be distinguished from *C. obsoleta* and its subspecies by having a more elongate and curved apical elytral lunule. A combination of this character with the impunctate elytra, tridentate labrum, and sparsely pilose under surface readily separates it from any of the subspecies of *C. obsoleta*. From *C. thalestris* Bates, which is also dull green in color, it can be separated by the sparsely pilose under surface, presence of elytral markings, and by its green rather than purple or bluish under surface. From *C. luteolineata* Chevrolat, with which it appears to be most closely allied, it can be separated by the all green color and angulate middle lunule. In *C. luteolineata* the basal and middle lunules are usually united; when they are broken the middle lunule is not angulate, and the elytra are dull black.

The illustration (taken from the literature) given by the writer (1954, fig. 43) is essentially correct so far as the elytral pattern is concerned, except for the middle lunule which is less transverse. The

shape of the pronotum is incorrect and is more like that given for *C. obsoleta latemaculata* (Cazier, 1954, fig. 44).

*Cicindela smaragdina* Chevrolat

Figure 2

*Cicindela smaragdina* CHEVROLAT, 1835, Coléoptères du Mexique, fasc. 8, species no. 179, *Cicindela* no. 19.

Medium-sized, robust; color dull alutaceous green, basal third of lateral elytral margins brilliant shining green, elytral disk with irregular, black, impressed areas; elytral lunules absent; pronotum sparsely pilose laterally; elytral apices separately rounded (female); under surface bare except for scattered hairs on metasternum and abdomen.

FEMALE: Head rugosely striate, impressed, head, including eyes, wider than pronotum; antennal segment 1 cupreous green, segments 2 through 4 cupreous, remainder black, scape with single subapical seta; labrum feebly tridentate or strongly unidentate and produced medially, single transverse row of submarginal setae; palpi black, with cupreous reflection apically; gena bare. Pronotum one-fourth wider than long, widest in front of middle, lateral margins strongly constricted towards base and apex, anterior margin wider than basal margin; anterior transverse impression deep, V-shaped, basal impression deep, straight, median line evident, not deeply impressed; sparsely pilose laterally; surface rugosely punctate, shallowly striate medially. Elytra strongly alutaceous, surface uneven, depressions irregular, depressions black, basal third of elytral margins faintly alutaceous, shining, apical margins not serrate, apices separately rounded. Under surface blue, green, or purple, lateral margins bare, proepisternum bare; legs cupreous green, middle and anterior trochanters with subapical setae. Length, 9.0–9.5 mm.; width, 4.0 mm.

Four female specimens of this uncommon species were submitted to the writer for identification by C. Bolivar. They were collected at El Zarco, Distrito Federal, May 15, 1951, 3100 meters. In the author's key to the Mexican species (1954), *C. smaragdina* Chevrolat runs to couplet 61 and has most of the characters given for *C. euthales* Bates. It differs from *C. euthales* by being smaller in size and by having the elytral apices separately rounded, the basal third of the elytral margins brilliant green and of a different texture than the discal surface, the elytral surface irregular and foveate, and the discal elytral surface irregularly marked with black.

The illustrations of the elytra and the pattern given by the writer (1954, fig. 33) are incorrect, unless there is a sexual difference.



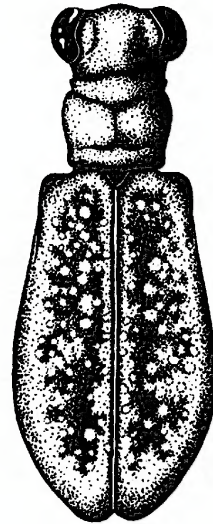
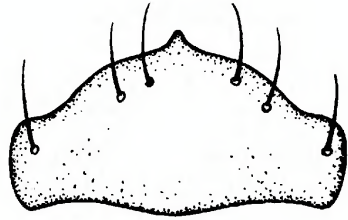
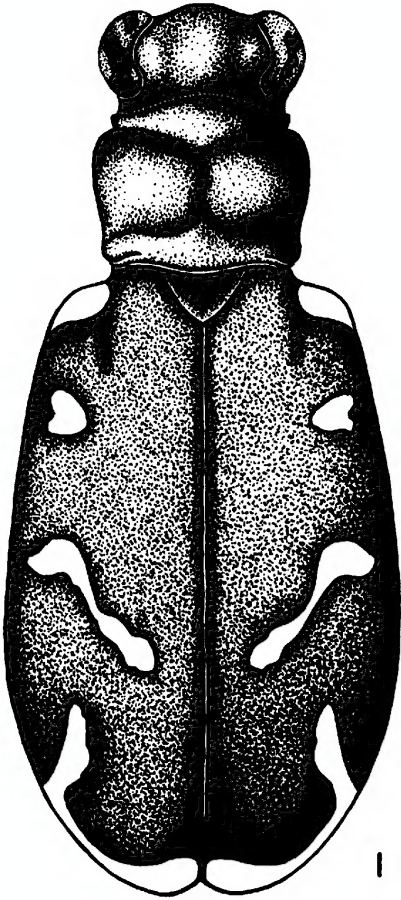
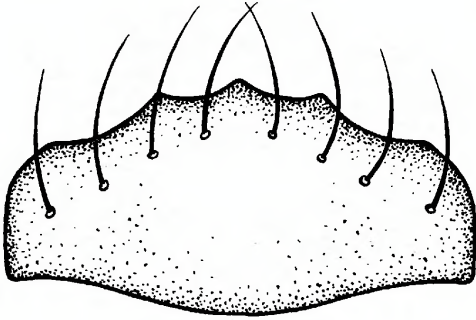


FIG. 1. *Cicindela craveri* Thomson, female.  
FIG. 2. *Cicindela smaragdina* Chevrolat, female.

*Cicindela aterrima* Klug

## Figure 3

*Cicindela aterrima* KLUG, 1834, Jahrb. Insectenk., p. 35.

The author (1954) recorded that specimens from Chihuahua and Durango were generally larger than those from the area around Distrito Federal. Series of specimens collected in the intervening area, Zacatecas, Aguascalientes, San Luis Potosi, Jalisco, and Guanajuato, include both large and small individuals in about equal proportions, and it would appear that there is a gradual size increase from south to



FIG. 3. Habitat of *Cicindela rugatilis*, *nigrocoerulea nigrocoerulea*, *aeneicollis*, *punctulata catharinae*, *sedecimpunctata sedecimpunctata*, *semicircularis*, and *aterrima*. Aguascalientes: El Retono, 10 miles east of Aguascalientes.

north along the central plateau. The new localities expand the southern portion of the distributional picture.

NEW DISTRIBUTIONAL RECORDS: *Durango*: Twelve miles southwest of Villa Madero, August 24, 1953. *Zacatecas*: Ojo Caliente, June 28, 1953. *Aguascalientes*: Aguascalientes, June 29, 1953; 15 miles east of Aguascalientes, June 27, 1953; El Retono, 10 miles east of Aguascalientes, June 26, 1953. *San Luis Potosi*: San Luis Potosi, June 24, 1953. *Jalisco*: Ojuelos, June 25, 1953; Cienega de Mata, August 19, 1953; Valle de Guadalupe, July 1, 1953. *Guanajuato*: Salamanca, August 14, 1953; San Miguel Allende, August 12, 1953. *Michoacan*: Zacapu, August 8, 1953; Cuitzeo, August 10, 1953.

*Cicindela rugatilis* Bates

Figures 3, 4

*Cicindela rugatilis* BATES, 1890, Trans. Ent. Soc. London, p. 497.

Series of specimens collected in the states of Aguascalientes and Jalisco are similar to those from Durango and Zacatecas and do not show the variability in color present in the more southern samples. They show every gradation in elytral markings from being immaculate to having the fully developed pattern.

NEW DISTRIBUTIONAL RECORDS: *Aguascalientes*: El Rentono, 10 miles

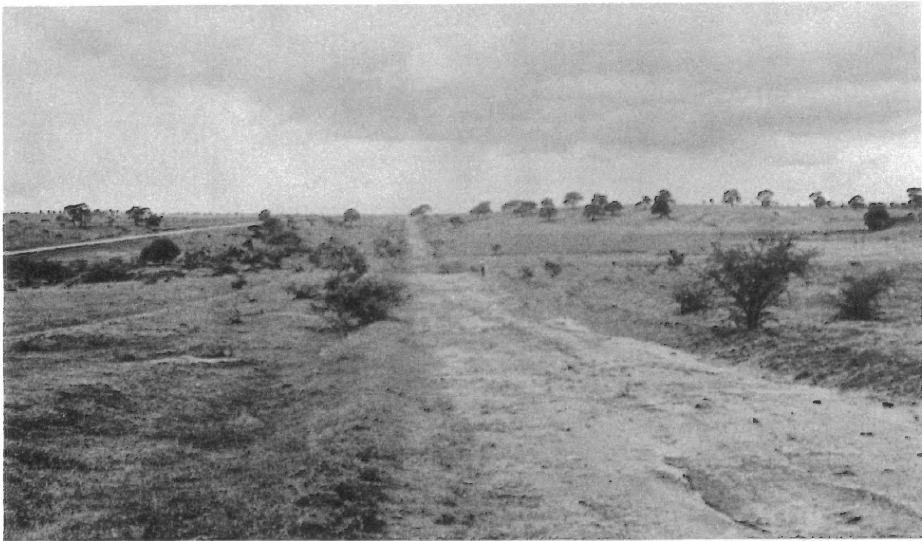


FIG. 4. Habitat of *Cicindela rugatilis*, *aeneicollis*, *luteolineata*, and *rufiventris reducens*. Jalisco: Highway to Ameca, 2 miles west of junction.

east of Aguascalientes, June 26, 1953; Aguascalientes, June 29, 1953. *Jalisco*: Lagos de Moreno, July 1, 1953; Tonalá, July 3, 1953; Arroyo Seco, Salatiitlan, July 6, 1953; 2 miles south of Tlaquepaque, July 11, 1953; El Refugio, 9 miles west of Tepatitlan, July 3, 1953; La Punta, August 19, 1953; Arenal, July 10, 1953; 5 miles east Guadalajara, July 2, 1953.

*Cicindela nigrocoerulea nigrocoerulea* LeConte

Figure 3

*Cicindela nigrocoerulea* LECONTE, 1848, Ann. Lyc. Nat. Hist., New York, vol. 4, p. 181.

The distribution of this subspecies has now been extended as far



south as Aguascalientes and San Luis Potosi. Series collected in the vicinity of Aguascalientes show the following variability in color: 92 black, 10 bluish purple, and two green; those from San Luis Potosi: two black and 10 green; and those from Zacatecas: one black and one green. Most of the individuals are immaculate, but a few have small isolated spots indicating the lunules.

NEW DISTRIBUTIONAL RECORDS: *Zacatecas*: Ojo Caliente, June 28,



FIG. 5. Habitat of *Cicindela nigrilabris, semicircularis*. Durango: Eighteen miles east of El Salto.

1953. *Aguascalientes*: Aguascalientes, June 29, 1953; 15 miles east of Aguascalientes, June 27, 1953; El Retono, 10 miles east of Aguascalientes, August 29, 1953. *San Luis Potosi*: San Luis Potosi, June 24, 1953.

*Cicindela nigrilabris* Bates

Figure 5

*Cicindela viatica* var. *nigrilabris* BATES, 1890, Trans. Ent. Soc. London, p. 495.

This species has previously been known only from the north-central mountain section of Mexico. Through the efforts of C. Bolivar, it is now known from as far south as Hidalgo. One black female was submitted for identification.

NEW DISTRIBUTIONAL RECORDS: *Hidalgo*: Hueyapan, July 4, 1953, 2050 meters (C. Bolivar).



*Cicindela luteolineata* Chevrolat

## Figure 4

*Cicindela luteolineata* CHEVROLAT, 1856, Rev. Zool. Paris, ser. 2, vol. 8, p. 351.

Most of the specimens of this species have the elytral markings as shown by the author (1954, fig. 42), but in a series of 75 specimens collected in Jalisco three have the basal and middle lunules separated, two have them narrowly connected, and 70 are as illustrated. Six specimens have the humeral spot of the basal lunule.

NEW DISTRIBUTIONAL RECORDS: *Jalisco*: Arroyo Seco Salatitlan, July 6, 1953; highway to Ameca, 2 miles west of junction, July 9, 1953; Pacana, July 4, 1953; north of Tepatitlan, July 5, 1953; 2 miles south of Tlaquepaque, July 11, 1953. *Michoacan*: Zacapu, August 8, 1953.

*Cicindela obsoleta juvenilis* W. Horn

*Cicindela obsoleta juvenilis* W. HORN, 1897, Deutsche Ent. Zeitschr., p. 169.

This subspecies is especially interesting because of the difference in variability between geographical samples of the total population. If the samples be taken in a north to south sequence along the coastal plain west of the Sierra Madre Occidental Mountains, the picture of variability as now known is as follows: in southern Sonora most of the individuals are maculated; in the vicinity of Culiacan, Sinaloa, 11 specimens are immaculate and only one is maculated; 13 specimens from around Mazatlan, Sinaloa, are maculated in varying degrees; in Nayarit 18 are immaculate and 20 maculated in varying degrees; from Jalisco two specimens are immaculate, six have only the humeral spot, one only the middle spot, and two have indications of all three lunules.

At Culiacan and Mazatlan they were collected along dirt roads and paths in the dense forest. The sample from Compostela, Nayarit, was taken around a temporary pool located in open grass land a considerable distance from any forest cover.

NEW DISTRIBUTIONAL RECORDS: *Sinaloa*: Five miles south of Mazatlan, August 3, 1953; 35 miles south of Mazatlan, July 24, 1954; 6 and 40 miles south of Culiacan, July 22, 1954. *Nayarit*: Six miles south of Tepic, July 27, 1953; Compostela, July 28, 1953, and July 27, 1954. *Jalisco*: Tequila, July 18, 1953; 10 miles south of Guadalajara, July 28, 1954; La Quemada, July 27, 1954.

*Cicindela aeneicollis* Bates

## Figures 3, 4, 6

*Cicindela aeneicollis* BATES, 1881, Biologia Centrali-Americana, Coleoptera, vol. 1, pt. 1, p. 13.

Additional samples of this species not only expand the distributional picture but also the range of variability in color. All samples from Sonora and Sinaloa are uniformly coppery red in color. In Nayarit the color begins to change. At 6 miles south of Tepic some of the individuals are greenish red, and at Rosamorada one specimen out of 17 is black except for the lateral margins of the under surface which are tinged with cupreous red. The Colima samples are all coppery red, as in the more northern samples. In Jalisco the green and blue forms appear in some samples in varying percentages as follows:

LOCALITIES	COPPERY RED	INTERMEDIATES	GREEN AND BLUE
Arenal	3	0	3
El Refugio	58	6	5
Tlaquepaque	13	1	9
Tonala	2	0	2
Salatitlan	2	9	6
Junction to Ameca	24	12	23
Ajijic	7	2	1
Guadalajara	8	2	1
Pacana	5	7	3
Tequila	2	4	0

All the rest of the Jalisco samples and those from Aguascalientes are coppery red, as in the more coastal samples. In Michoacan there are one green and two coppery red in a sample taken 10 miles north of Morelia. It would appear that the green form occurs only in the samples taken at high elevations, but not all of these show the green variation. The presence of intermediates between the coppery red and green phases in eight samples and the occurrence of pure coppery red samples intermixed with the variable ones give support to the author's conclusion (1954) that *C. aeneicollis viridis* Becker is an individual variant and not a subspecies.

NEW DISTRIBUTIONAL RECORDS: *Sinaloa*: Mazatlan, July 22, 1954; 5 miles south of Mazatlan, August 3, 1953; 35 miles south of Mazatlan, July 24, 1954; 16 miles north of Rosario, August 3, 1953; 6 miles south of Culiacan, July 22, 1954; Concordia, August 2, 1953. *Nayarit*: Near Santiago Ixcuintla, July 29, 1953; Rosamorada, August 4, 1953, and July 24, 1954; 8 miles north of Tepic, July 25, 1954; 6 miles south of Tepic, July 27, 1953; Compostela, July 28, 1953; Navarrete, July 28, 1953. *Colima*: Twelve miles east of Colima, July 28, 1953; Tecolapa, July 21, 1953, and July 31, 1954; Armeria, July 21, 1953; Manzanillo, July 19, 1953; Cuyutlan, July 18, 1953; 5 miles southwest of Colima, July 18, 1953; 10 miles south of Tonila, July 17, 1953. *Jalisco*: Lake

Zacoalco, July 8, 1953; Ajijic, Lake Chapala, July 7, 1953, and July 28, 1954; Tonalá, July 3, 1953; 2 miles south of Tlaquepaque, July 11, 1953; Arroyo Seco, Salatiitlan, July 6, 1953; 5 miles east of Guadalajara, July 2, 1953; 10 miles south of Guadalajara, July 28, 1954; Pacana, July 4, 1953; Tequila, July 18, 1953; Arenal, July 10, 1953; Lagos de Moreno, July 1, 1953, and August 17, 1953; El Refugio, 9 miles west of Tepatitlan, July 3, 1953; highway to Ameca, 2 miles west of junction,

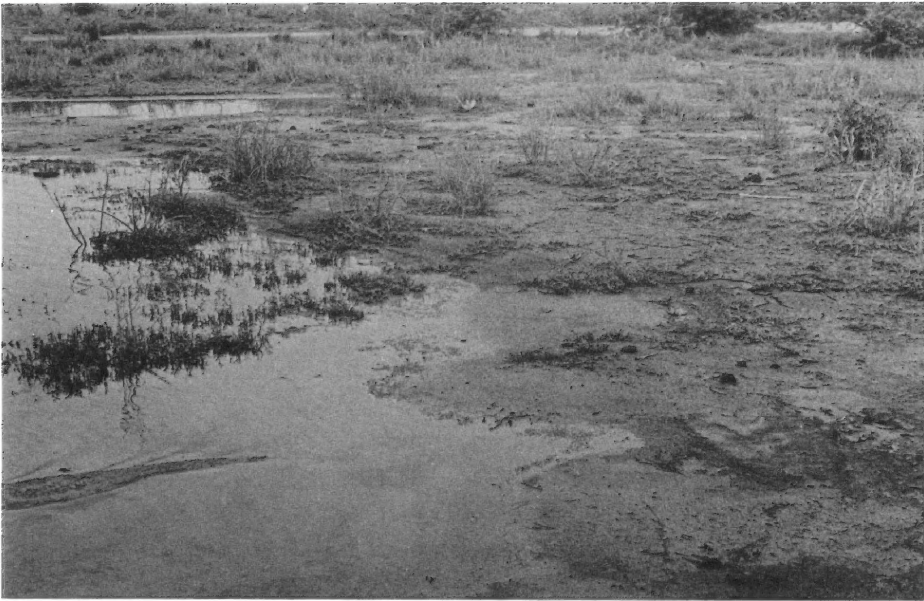


FIG. 6. Habitat of *Cicindela auraria euryscopa*, *californica brevihamata*, *sinaloae digueti*, *carthagera carthagera*, *wickhami*, *trifasciata ascendens*, *macrocnema macrocnema*, *aeneicollis*, *argentata hemichrysea*, and *tenuisignata*. Sinaloa: Mazatlan.

July 9, 1953; Las Fuentes, near Guadalajara, July 13, 1953; Amacueca, July 8, 1953; north of Tepatitlan, July 5, 1953; Encarnacion de Diaz, August 18, 1953; Le Quemada, July 27, 1954; Ocotlan, July 11, 1953. *Aguascalientes*: Aguascalientes, June 29, 1953; 15 miles east of Aguascalientes, June 27, 1953; Mal Paso, 7 miles east of Calvillo, June 27, 1953; El Retono, 10 miles east of Aguascalientes, June 26, 1953. *Michoacan*: 10 miles north of Morelia, August 10, 1953.

*Cicindela lemniscata lemniscata* LeConte

*Cicindela lemniscata* LECONTE, 1854, Proc. Acad. Nat. Sci. Philadelphia, vol. 7, p. 220.

Until the present writing, numerous samples of both *C. lemniscata*

*lemniscata* and *C. lemniscata rebaptisata* have shown little or no variability in the maculations, size, and color of the elytra. However, three samples from Nayarit are variable in all three characters. Although the legs are slightly more pigmented than in typical *C. lemniscata*, the Nayarit specimens are placed tentatively under that subspecies, because a few specimens from Sinaloa and southern Sonora appear to be intermediate in this character. Whether or not these Nayarit samples are deserving of subspecific status must await the time when large samples from Sinaloa are available.

In a series of 27 specimens collected 8 miles north of Tepic, Nayarit, seven have all three lunules united, 14 have the apical and middle lunules separated and the basal lunule interrupted at the humerus, five have all three lunules separated, and one specimen has the middle lunule only faintly indicated. Only one specimen in this series is greenish. In 37 specimens collected 6 miles south of Tepic, 32 have all three lunules united, three have the apical lunule separated from the middle, and two have the basal lunule separated from the middle. In this series the color grades gradually from red to brilliant cupreous green. In 13 specimens collected at Navarrete, Nayarit, four have the markings complete, four have the middle lunule separated from the apical, and five have all three lunules separated. The color in this series is cupreous red as in typical *C. lemniscata*. In all three samples from Nayarit the average size of the individuals is smaller than is that of adjacent geographical samples.

NEW DISTRIBUTIONAL RECORDS: *Sonora*: Ten miles west of Alamos, July 21, 1954. *Sinaloa*: Sixteen miles north of Rosario, August 3, 1953. *Nayarit*: Eight miles north of Tepic, July 25, 1954; 6 miles south of Tepic, July 27, 1953; Navarrete, July 28, 1953.

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